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ALGEBRA.

173. Proposed by JOHN M. COLAW, A. M., Monterey, Va.

Solve $\sqrt{a+x+y}=x$(1), $\sqrt{b+y+z}=x$(2), $\sqrt{c+z+x}=x$(3).

Solution by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

From (2), (3), and (1), we have

$$x^2 - y - z = b \dots (4),$$

$$y^2 - z - x = c \dots (5),$$

$$z^2 - x - y = a \dots (6).$$

From (4) and (5); from (5) and (6); from (6) and (4), we have

$$(x-y)(x+y+1) = b - c \dots (7),$$

$$(y-z)(y+z+1) = c - a \dots (8),$$

$$(z-x)(z+x+1) = a - b \dots (9).$$

By addition of corresponding members of (7), (8), (9), we get

$$(x-y)(x+y+1) + (y-z)(y+z+1) + (z-x)(z+x+1) = 0 \dots (10).$$

It is easy to see that either $x=y=z \dots (11)$,

$$\text{or } x+y+1=y+z+1=z+x+1=0 \dots (12),$$

will satisfy (10). From (11), (4), (5), (6), we find

$$x=y=z=1 \pm \sqrt{b+1}, 1 \pm \sqrt{c+1}, 1 \pm \sqrt{a+1}.$$

From (4), (5), (6), (12), we obtain

$$x=\pm \sqrt{b-1}, y=\pm \sqrt{c-1}, z=\pm \sqrt{a-1}.$$

Also solved by MARCUS BAKER, and G. B. M. ZERR.

174. Proposed by HARRY S. VANDIVER, Bala, Pa.

If the quantity x be expressed in the form of a continued fraction P_n/Q_n , denoting the $(n+1)$ th convergent, with x_n the corresponding complete quotient, then $\frac{P_{n-(k-1)} - Q_{n-(k+1)}x}{P_n - Q_n x} = (-1)^{k+1} x_n \times x_{n-1} \dots x_{n-k}$.

Solution by G. B. M. ZERR, A. M., Ph.D., The Temple College, Philadelphia, Pa., and J. E. SANDERS, Hackney, Ohio.

$$x = \frac{x_n P_n + P_{n-1}}{x_n Q_n + Q_{n-1}} \text{ or } x_n = \frac{x Q_{n-1} - P_{n-1}}{P_n - x Q_n}.$$